

We Claim:

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1. A method for transcutaneous immunization comprising:
 - (a) providing a formulation comprised of at least one molecule which is an antigen or a polynucleotide encoding said antigen, wherein said formulation does not include heterologous adjuvant;
 - (b) applying said formulation epicutaneously to skin of an organism without penetrating said skin's dermis layer; and
 - (c) inducing an antigen-specific immune response in said organism, wherein at least one epitope of said antigen is recognized.
2. A method of claim 1, wherein the molecule also has adjuvant activity.
3. A method of claim 1 further comprising processing the antigen by at least one antigen presenting cell (APC), wherein at least an immunogenic epitope of said antigen is presented by the APC.
4. A method of claim 3, wherein the APC is a Langerhans cell.
5. A method of claim 1 further comprising activating at least one antigen presenting cell (APC) underlying where the formulation is applied.
6. A method of claim 5, wherein the APC is a Langerhans cell.
7. A method of claim 1 further comprising inducing an increase in antigen presenting cells (APCs) at the formulation's site of application.
8. A method of claim 7, wherein the APCs are Langerhans cells.
9. A method of claim 1 further comprising hydrating the skin.
10. A method of claim 7, wherein hydration enhances the antigen-specific immune response as compared to application of the formulation without hydration.

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11. A method of claim 1, wherein a physical, chemical, electrical, or sonic penetration enhancer is not involved in application of the formulation.
12. A method of claim 1, wherein the formulation does not include a penetration enhancer, viral particle, liposome, proteosome, or chemical transfectant.
13. A method of claim 1, wherein an allergic or atopic reaction is not induced.
14. A method of claim 1, wherein the organism is a human and induction of the antigen-specific immune response provides a prophylactic treatment.
15. A method of claim 1, wherein the organism is a human and induction of the antigen-specific immune response provides a therapeutic treatment.
16. A method of claim 1, wherein the organism is an animal and induction of the antigen-specific immune response provides a prophylactic treatment.
17. A method of claim 1, wherein the organism is an animal and induction of the antigen-specific immune response provides a therapeutic treatment.
18. A method of claim 1, wherein the antigen has a molecular weight greater than 1000 daltons.
19. A method of claim 1, wherein the antigen has a molecular weight greater than 2500 daltons.
20. A method of claim 1, wherein the antigen has a molecular weight greater than 5000 daltons.
21. A method of claim 1, wherein the antigen has a molecular weight greater than 10,000 daltons.

22. A method of claim 1, wherein the antigen is proteinaceous and has a molecular weight greater than 2500 daltons.

23. A method of claim 1, wherein the antigen is proteinaceous and has a molecular weight greater than 5000 daltons.

24. A method of claim 1, wherein the antigen is proteinaceous and has a molecular weight greater than 10,000 daltons.

25. A method of claim 1, wherein the antigen-specific immune response recognizes at least one pathogen.

26. A method of claim 25, wherein the pathogen-specific immune response provides at least some protection for the immunized organism against infection by the pathogen as compared to a non-immunized organism.

27. A method of claim 1, wherein the organism is a human.

28. A method of claim 27, wherein the antigen-specific immune response recognizes at least one pathogen and provides at least some protection for the immunized human against infection by the pathogen as compared to a non-immunized human.

29. A method of claim 25, wherein the pathogen is a bacterium.

30. A method of claim 25, wherein the pathogen is a virus.

31. A method of claim 25, wherein the pathogen is a fungus.

32. A method of claim 25, wherein the pathogen is a parasite.

33. A method of claim 1, wherein the induced immune response recognizes at least one surface antigen of a pathogen.

34. A method of claim 1, wherein the induced immune response recognizes at least one carbohydrate antigen of a pathogen.

35. A method of claim 1, wherein the induced immune response recognizes at least one glycolipid antigen of a pathogen.

36. A method of claim 1, wherein the induced immune response recognizes at least one glycoprotein antigen of a pathogen.

37. A method of claim 1, wherein the induced immune response recognizes at least one lipoprotein antigen of a pathogen.

38. A method of claim 1, wherein the antigen is provided in whole-cell form selected from the group consisting of live microbes, attenuated microbes, and inactivated microbes.

39. A method of claim 1, wherein the antigen is provided in a viral particle or virion form selected from the group consisting of live viruses, attenuated viruses, and inactivated viruses.

40. A method of claim 1, wherein the antigen is provided in a whole-cell form selected from the group consisting of live bacteria, attenuated bacteria, and inactivated bacteria.

41. A method of claim 1, wherein the antigen is provided in a cell-free form.

42. A method of claim 1, wherein the formulation consists essentially of molecules which are antigens.

43. A method of claim 1, wherein the formulation consists essentially of molecules which are polynucleotides encoding antigen.

44. A method of claim 1, wherein the molecule is a plasmid which encodes antigen.

45. A method of claim 1, wherein the induced immune response recognizes an autoantigen.

46. A method of claim 45, wherein the autoantigen-specific immune response provides treatment for at least one autoimmune disease or other autoimmune condition.

47. A method of claim 1, wherein the induced immune response recognizes a human autoantigen.

48. A method of claim 1, wherein the induced immune response recognizes a tumor antigen.

49. A method of claim 48, wherein the tumor antigen-specific immune response provides treatment for at least one neoplastic disease or other neoplastic condition.

50. A method of claim 1, wherein the induced immune response recognizes a human tumor antigen.

51. A method of claim 1, wherein the induced immune response recognizes an allergen.

52. A method of claim 51, wherein the allergen-specific immune response provides treatment for at least one allergy or other allergic condition.

53. A method of claim 1, wherein the antigen is an ADP-ribosylating exotoxin genetically or chemically modified to be less toxic to the organism than non-modified ADP-ribosylating exotoxin.

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54. A method of claim 1, wherein the induced immune response recognizes an ADP-ribosylating exotoxin selected from the group consisting of cholera (CT), diphtheria (DT), pertussis (PT), and tetanus (TT).

55. A method of claim 1, wherein the induced immune response recognizes a lipopolysaccharide (LPS).

56. A method of claim 1, wherein the induced immune response recognizes an antigen selected from the group consisting of influenza virus hemagglutinin (HA), influenza virus nucleoprotein (NP), *Hemophilus influenza* B polysaccharide conjugate (Hib-PS), and *Escherichia coli* colonization factor CS6.

57. A method of claim 1 further comprising lysing at least some endosomes or lysosomes underlying where the formulation is applied.

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58. A method of claim 1, wherein the antigen or polynucleotide encoding the antigen is conjugated to a heterologous molecule which targets an antigen presenting cell.

59. A method of claim 1 further comprising inducing systemic immunity specific for the antigen.

60. A method of claim 1 further comprising inducing mucosal immunity specific for the antigen.

61. A method of claim 1, wherein the formulation is applied to the skin for less than three hours.

62. A method of claim 1, wherein the formulation is applied to the skin for less than two hours.

63. A method of claim 1, wherein the formulation is applied to the skin for more than one hour.

64. A method of claim 1, wherein the formulation is applied in dry form.

65. A method of claim 1, wherein the formulation is applied in liquid form.

66. A method of claim 1, wherein the formulation is provided in a form selected from the group consisting of cream, emulsion, gel, lotion, ointment, paste, and suspension.

67. A method of claim 1, wherein the formulation is further provided in a container suitable for immersion or spraying of the organism.

68. A method of claim 1, wherein the antigen-specific immune response is induced after only one application of the formulation to the skin.

69. A method of claim 1, wherein the formulation is packaged in a unit dosage form which is effective to provide some beneficial immunologic treatment after one application of the formulation to the skin.

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